CLAIMS

1. A method of manufacturing a mask, comprising the steps of:

preparing a structured material comprising a plurality of columnar members and a region surrounding the columnar members;

removing the columnar members from the structured material to form a porous material having columnar hole; and

introducing a mask material into the columnar hole of the porous material.

2. The method of manufacturing a mask member according to claim 1, wherein the columnar members of the structured material which are so formed as to contain a first material are surrounded by the region which is so formed as to contain a second material, and wherein the second material is contained at a ratio of not less than 20 atomic% and not more than 70 atomic% with respect to the total amount of the first material and the second material.

3. A mask member obtained by introducing a mask material into a porous material obtained by removing columnar members from a structured material which is so formed as to include the columnar members and a

region surrounding the columnar members.

4. The mask member according to claim 3, wherein the columnar members of the structured material which are so formed as to contain a first material are surrounded by the region which is so formed as to contain a second material, and wherein the structured material contains the second material at a ratio of not less than 20 atomic% and not more than 70 atomic% with respect to the total amount of the first material and the second material.

5. A columnar structured material having a columnar structure formed on a substrate, characterized in that the columnar structure is formed through an etching process in which dots are utilized as a mask on a substrate, the dots being made of a mask material and obtained by removing a porous material after the mask material is introduced into holes of the porous material having columnar holes formed by removing columnar substances from a structured material in which the columnar substances which are so formed as to contain a first component are dispersed in a member which is so formed as to contain a second component that can form a eutectic together with the first component.

6. The columnar structured material according to claim 5, wherein the structured material is formed of a thin film.

7. The columnar structured material according to claim 5, wherein the columnar substance is of aluminium and the member is of silicon, and wherein the ratio of silicon in the structured material is in a range of not less than 20 atomic% and not more than 70 atomic%.

8. The columnar structured material according to claim 5, wherein the columnar substance is of aluminium and the member is of germanium, and wherein the ratio of germanium in the structured material is in a range of not less than 20 atomic% and not more than 70 atomic%.

9. The columnar structured material according to claim 5, wherein a main component of the porous material is silicon.

10. The columnar structured material according to claim 5, wherein a main component of the porous material is germanium.

11. The columnar structured material according

to claim 5, wherein the diameter of the columnar structured material is not smaller than 0.5 nm and not larger than 15 nm.

12. The columnar structured material according to claim 5, wherein the interval between adjacent column of the columnar structured material is not smaller than 5 nm and not larger than 20 nm.

13. The columnar structured material according to claim 5, wherein the columnar substance is of a crystalline substance, and the member is of an amorphous substance.

14. The columnar structured material according to claim 5, wherein the mask material forming the dots contains a noble metal.

15. The columnar structured material according to claim 14, wherein the noble metal is gold.

16. The columnar structured material according to claim 5, wherein the columnar structured material is composed of one layer or a plurality of layers of materials.

17. The columnar structured material according

to claim 16, wherein at least one of the one layer or the plurality of layers of materials is a semiconductor.

18. A method of manufacturing a columnar structured material, comprising:

a step of preparing, on a substrate, a structured material in which columnar substances which are so formed as to contain a first component are dispersed in a member which is so formed as to contain a second component that can form a eutectic together with the first component;

a removal step of removing the columnar substances;

an introducing step of introducing a mask material into columnar holes of a porous material having the columnar holes obtained through the removal step;

a step of preparing dots made of the mask material by removing the member;

a step of etching the substrate with the dots as a mask; and

a step of removing the dots.

19. The method of manufacturing a columnar structured material according to claim 18, wherein the removal step of removing the columnar substances

is an etching step.

20. The method of manufacturing a columnar structured material according to claim 18, wherein the introducing step of introducing a mask material into the holes is an electrodeposition step.

21. The method of manufacturing a columnar structured material according to claim 18, wherein the step of etching the substrate with the dots as a mask is a dry etching step.